

THE WOLF SPIDERS OF AUSTRALIA (ARANEAE:LYCOSIDAE): 4.
THREE NEW SPECIES FROM MOUNT KOSCIUSKO, N.S.W.

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ABSTRACT

Three previously undescribed species of Wolf Spider, *Lycosa summa*, *Lycosa kosciuskoensis* and *Lycosa musgravei* are recorded from Mount Kosciusko, New South Wales.

Mount Kosciusko with an elevation of 2,230 m, situated on the Kosciusko Plateau near the border of New South Wales and Victoria, is the most elevated area in Australia. The highest portions of the plateau are covered with snow from eight to nine months of the year and some snow drifts may persist throughout the summer.

McLuckie and Petrie (1927) have drawn attention to the extreme shortness of the vegetative season at these high altitudes and their study of the plant communities of the Kosciusko Plateau led them to recognise three zones: the Montane zone from 3,000 to approximately 5,000 feet (900–1500 m), the subalpine zone from approximately 5,000 feet (1500 m) to the tree-line at 6,000 to 6,500 feet (1800–2000 m), and the alpine zone from the tree-line to the highest elevations. In the alpine zone the continuous cover of snow throughout nine months of the year has a very pronounced effect on the vegetation. All the herbaceous types die down when the snow comes, but perennate from season to season by subterranean organs of propagation. The snow grass *Poa caespitosa* occurs throughout the alpine zone into the subalpine zone, and provides some cover for small animals dwelling above the tree-line. The summits of certain peaks represent an extremely barren habitat with practically no soil. Dulhunty (1947) records the soil as consisting mainly of sand and gravel derived from granite. On the slopes and hill sides, the surface layer of soil, 6–8 inches deep, is of dark colour due to the accumulation of humus. Peat formation occurs in upland swamp areas, and Dulhunty recorded subsurface peat temperatures at 9 inches and 3 feet (ca. 200 mm and 1 m). The surface temperatures during the investigation in 1945–46 at an elevation of 6,200 feet (1900 m) ranged from 17.2°C during January to at least freezing point during winter; subsurface temperature within the peat deposit at 9 inches did not fall below 1.1°C during the 1945–46 winter. Gentilli (1971, p. 129) gives the lowest temperature so far recorded in Australia as –22°C, at 1830 m (about 6,000 feet) just below Charlotte Pass (Kosciusko Plateau) on July 14, 1945, and August 22, 1947. At Lakeside Inn (formerly Kosciusko Hotel: 1529 m) the mean annual temperature is 6.3°C. The mean daily minimum is below freezing from May to September inclusive. On Hotham Heights, Victoria (1860 m), the mean annual temperature is 4.7°C.

In such a harsh environment one would not expect to find lycosid spiders, but in January, 1929, a party from the Australian Museum consisting of Mr A. Musgrave, Curator of Insects and Arachnids, Mr H. O. Fletcher, Assistant in Palaeontology, and Mr W. Boardman, Assistant Zoologist, visited the Kosciusko plateau and camped inside a stone hut at the foot of Mount Kosciusko, where they spent a few days collecting. Two species of *Lycosa* were collected from burrows and from below stones among the clumps of snow grass at 7,000 feet (2140 m). Musgrave (1930) gives an account of the expedition and provides a photograph of 'an apparently new species of *Lycosa* or Wolf Spider which made its lair among the Snow grass on the sides of Mount Kosciusko' (here described as *Lycosa summa* sp. nov.). Three lycosid spiders are now known from Mount Kosciusko, and a related species *Venatrix fuscus*, from Mt. Hotham (6,000 feet).

The life history of these montane species is poorly known and would undoubtedly make a very fascinating study considering the extremely short period available for feeding and reproduction. McKay (1973) has outlined the method of capture in a brief introduction to the revision of the Australian Wolf spiders.

***Lycosa summa* sp. nov.**
(Figures 1a–c, g–i)

Lycosa sp.: Musgrave, 1930, pp. 103 (Fig.), 104.

MATERIAL EXAMINED

HOLOTYPE: Australian Museum AM K61669, ♀ M, C.L. 10.7 mm, Mount Kosciusko, 7000 feet (2140 m), N.S.W., collected by A. Musgrave and H. O. Fletcher, 7 January, 1929. In spirit.

PARATYPES: Mount Kosciusko, 7000 feet (2140 m); A. Musgrave, H. O. Fletcher, 7.i.1929, 1 ♀ M, 1 ♂ P, AM K61669, 2 ♀ M, 1 ♂ P, 4J, AM K61667, 1 ♀ M, AM K61668, 2 ♀ P, 1J, AM K61670; H. O. Fletcher, 7 ii.1929, 1 ♀ M, AM K61671.

DESCRIPTION

Based on the holotype.

Carapace light brown to fawn (white in life?) with a dark brown triangular shaped area extending over each side of the carapace from the PL eye; three dark brown stripes radiate from the fovea, but these do not reach the margin, the most posterior one is broad and wedge-shaped; paturon dark brown to black, the anterior surface with a buff coloured stripe reaching from the base to about 2/3 distance to the fang; fang black; labium, maxillae, sternum and ventral surface of coxae black-brown. Abdomen dark brown above becoming light brown on the sides; a wide pale brown to fawn (white in life?) longitudinal stripe, rounded anteriorly, pointed posteriorly, extends from the anterior dorsal surface to just before the spinnerets, and encloses a dark brown hastate stripe anteriorly, so that it appears to be a loop-like pale fawn marking; venter black, the anterior part extending up the sides of the abdomen where it is clearly outlined with pale brown. Legs dark brown, the ventral surface and lower sides of the femora pale brown to fawn; the ventral tips of the tibiae of the fourth legs fawn. The holotype is illustrated in Figure 1a–c (a photograph of a female is provided by Musgrave, 1930, p. 103).

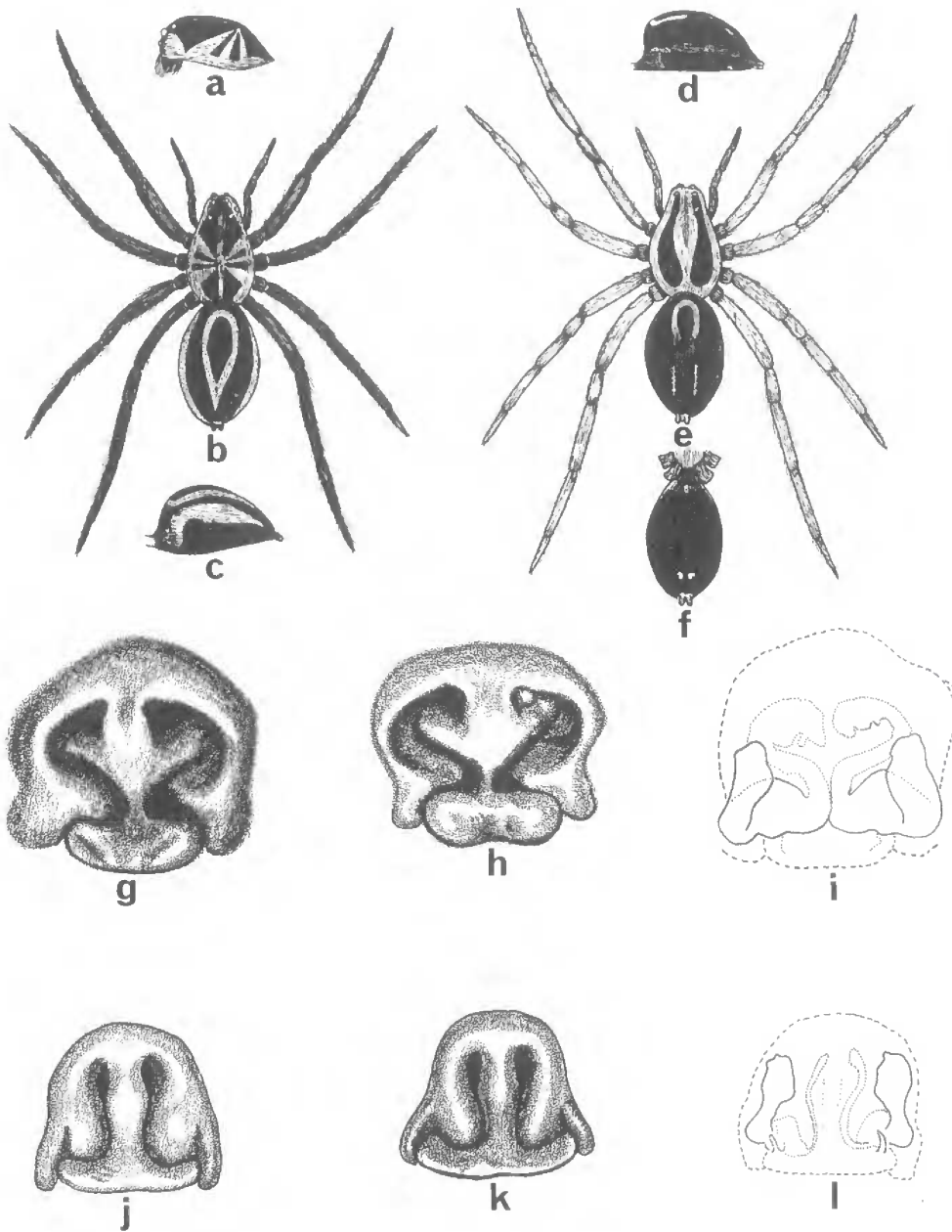


FIG. 1: a–c, g–i, *Lycosa summa*. a, lateral view of carapace; b, holotype; c, lateral view of abdomen; g, epigynum of holotype; h, epigynum of AM K61668; i, internal genitalia of AM K61668.

d–f, j–l, *Lycosa kosciuskoensis*. d, lateral view of abdomen; e, holotype; f, ventral surface of abdomen of AM K61673; j, epigynum of holotype; k, epigynum of paratype AM K61675; l, internal genitalia of AM K61675.

Anterior row of eyes very slightly procurved, AM about the same diameter as AL, PM little more than twice the diameter of the AM, and 2.3 of their diameter apart. Ratio of eyes AM:AL:PM:PL = 11:11:24:20; distance AM:AM 7, AM:AL 4, AM:PM 11, AL:PM 11, PM:PM 16. Clypeus to AM 20. Length of first eye row 61; length of second eye row 60.

Cheliceral with three promarginal teeth, the middle one largest and joined to the base of the outer tooth; three retromarginal teeth of equal size. Labium as broad as long.

TABLE 1: MEASUREMENTS OF LEG SEGMENTS OF *L. summa* IN MM.

Leg	Femur	Patella	Tibia	Metatarsus	Tarsus
1	6.9	3.3	5.3	5.5	3.2
2	6.2	3.1	4.5	5.1	3.1
3	5.7	3.1	3.5	4.5	2.8
4	7.0	3.2	5.2	6.6	3.4
Palp	3.9	1.8	2.2	—	3.0

VARIATION: Penultimate males have the same colour pattern as the female. The epigynum of the holotype, and the epigynum and internal genitalia of a paratype is illustrated (Fig. 1g-i). The eye diameters and interspaces of the holotype and eight paratypes are given as a per cent of the total width of the first row of eyes in Table 2.

TABLE 2: EYE DIAMETERS AND INTERSPACES OF *L. summa* CONVERTED TO PERCENT OF THE TOTAL WIDTH OF THE FIRST ROW OF EYES

Regd No.	Sex	C.L.	AM	AL	PM	PL	AM:AM	AM:AL	PM:PM	AM:PM	AL:PM
Holotype	♀ M	10.7	18	18	39	33	11	7	26	18	18
K61669	♀ M	10.0	18	18	40	35	12	6	25	14	15
K61669	♂ P	7.6	18	18	38	32	12	7	30	18	18
K61667	♀ M	10.6	18	18	40	34	13	6	27	16	18
K61667	♀ P	8.9	18	19	40	33	13	8	26	18	18
K61670	♀ P	8.9	18	18	41	32	9	7	25	15	16
K61670	♀ J	6.3	19	19	39	33	13	7	29	16	15
K61671	♀ M	10.3	18	17	37	33	14	9	29	18	19
K61668	♀ M	9.8	19	17	38	35	12	7	26	18	19

The first row of eyes usually shorter than the second row, the ratio's for the holotype and paratypes are 61:60, 60:61, 50:50, 62:64, 54:56, 88:89, 69:70, 100:100, 95:96.

SIZE RANGE: Mature females C.L. 8.9 to 10.7 mm.

DIAGNOSIS: *Lycosa summa* is similar to *Venatrix fuscus*, but differs in having a loop-like fawn or white marking on the dorsal surface of the abdomen, and no white longitudinal markings on the venter. The epigynum is of similar shape in possessing an expanded mid-section of the median guide, but the transverse guide is shorter than in *V. fuscus*. The penultimate male of *L. summa* has the loop-like fawn markings on the dorsum of the

abdomen as in the female; *V. fuscus* males have a wide fawn bar that extends from the anterior dorsal surface of the abdomen and narrows to reach the spinnerets.

LIFE HISTORY

Mature females and penultimate males were collected in January, and one mature female in February. This species, as in *Lycosa kosciuskoensis*, presumably overwinters beneath the snow in the alpine regions of Mount Kosciusko.

BURROW

The specimens found among the snow grass on the sides of Mount Kosciusko, were dug from '... a simple hole in the ground sometimes surmounted by a turret' (Musgrave, 1930, p. 104, and on label with specimens).

DISCUSSION

Lycosa summa keys down to the genus *Venatrix* (type species *V. fuscus*) using Guy (1966), but differs in having the AM:AM larger than AM:AL, and in having the first row of eyes shorter than the second in some specimens. Those specimens with the first eye row shorter than the second would key down to *Orinocosa* as does *Lycosa kosciuskoensis*. I have placed my new species into the genus *Lycosa* pending a generic revision of the Australian Lycosinae.

DERIVATION

From the latin *summus* meaning highest or uppermost.

***Lycosa kosciuskoensis* sp. nov.**
(Figure 1d, f, j-l)

MATERIAL EXAMINED

HOLOTYPE: Australian Museum AM K61675, ♀ M, C.L. 8.7 mm, near Lake Albina, Mount Kosciusko, N.S.W., collected by A. Musgrave, 6 January, 1929. In spirit.

PARATYPES: Mount Kosciusko; 7000 feet (2140 m), A. Musgrave, H. O. Fletcher, 7.i.1929, 1 ♀ M, AM K61691, 1 ♀ M, AM K61672, 3 ♀ M, AM K61674; near Lake Albina, A. Musgrave, 6.i.1929, 1 ♀ M, AM K61675: 7000 feet (2140 m), H. O. Fletcher, 7.ii.1929, 2 ♀ J, AM K61676; Summit 7328 feet (2235 m), A. Musgrave, H. O. Fletcher, 7.i.1929, 3 ♀ M, 2 ♀ P, AM K61673; near Lake Cootapatamba, H. O. Fletcher, A. Musgrave, 7.i.1929, 1J, AM K61680.

DESCRIPTION

Based on holotype.

Carapace dark brown with a well defined fawn to pale brown marginal band extending around the edge of the carapace and joining a wide fawn to pale brown longitudinal stripe that commences behind the PM eyes, extends between the PL eyes, and broadens noticeably to about the middle of the carapace where it tapers slightly to join the lateral band; some

wedge shaped darker brown markings radiate across the sides at the middle of the carapace; paturon black with the anterior surface orange; lateral condyle dark brown; fangs black; labium and maxillae black; sternum and ventral surface of coxae dark brown to black. Abdomen brown above and on sides, but separated from the black venter by a pale fawn line; anterior slope of the abdomen darker brown with a very distinct narrow, hastate, dark brown longitudinal spot surrounded by a narrow fawn band that becomes somewhat diffuse posteriorly; more posteriorly on the dorsal surface are two distinct brown-edged cream parallel lines not quite reaching the spinnerets; venter jet black with two cream to pale yellowish dots located before the spinnerets (Fig. 1f). Legs brown, darker below, the femoral and metatarsal joints light brown, spines black.

Anterior row of eyes gently procurved, only slightly shorter than the second row, AM slightly larger than AL, PM about twice the diameter of the AM and two thirds their diameter apart. Ratio of eyes AM:AL:PM:PL = 10:7:9:21:18; distance AM:AM 4, AM:AL 3, AM:PM 8, AL:PM 9, PM:PM 14. Clypeus to AM 10. Length of first eye row 52; length of second eye row 55.

Chelicerae with three promarginal teeth, the middle one much larger than the minute laterals; three retromarginal teeth, the inner two larger than the reduced lateral. Labium about as wide as long.

TABLE 3: MEASUREMENTS OF LEG SEGMENTS OF *L. kosciuskoensis* IN MM.

Leg	Femur	Patella	Tibia	Metatarsus	Tarsus
1	5.8	3.3	4.2	4.1	2.5
2	5.5	3.0	3.8	3.8	2.7
3	4.9	2.9	3.2	4.4	2.9
4	6.5	3.3	5.0	6.5	3.1
Palp	3.2	1.9	1.8	—	2.2

The second right leg (not measured) is a replacement leg in the holotype.

VARIATION: The holotype has indistinct dark radiating wedge-shaped areas on the dark brown sides of the carapace, which disappear when the hair on the carapace dries; it is not known if these wedge-shaped marks are present in life. Two juvenile specimens have the adult coloration as described above, except that the venter has two tapering, parallel, yellowish bars from about the middle of the venter to near the spinnerets. The epigynum of the holotype and the epigynum and internal genitalia of a paratype is illustrated (Fig. 1j-l). The eye diameters and interspaces of eight paratypes are given as a per cent of the total width of the first row of eyes in Table 4. First row of eyes shorter than the second row in the ratio 56:57, 58:62, 56:61, 57:62, 47:51, 57:61, 55:58, 49:53.

SIZE RANGE: Mature females C.L. 8.1 to 9.9 mm.

DIAGNOSIS: *Lycosa kosciuskoensis* most clearly resembles *Lycosa summa* but lacks the expanded mid-section of the median guide of the epigynum, and has a different coloration. The longitudinal stripe on the carapace is conspicuously wider than in *L. summa*;

TABLE 4: EYE DIAMETERS AND INTERSPACES OF *L. kosciuskoensis* CONVERTED TO PERCENT OF THE TOTAL WIDTH OF THE FIRST ROW OF EYES

Regd No.	Sex	C.L.	AM	AL	PM	PL	AM:AM	AM:AL	PM:PM	AM:PM	AL:PM
K61676	♀ M	8.7	21	20	41	34	7	4	25	14	11
K61673	♀ M	9.2	21	19	41	36	7	5	26	12	12
K61673	♀ M	9.3	21	19	43	36	8	6	25	14	12
K61673	♀ M	9.1	21	19	39	35	9	5	28	16	14
K61673	♀ P	7.7	21	19	45	38	7	6	25	14	15
K61674	♀ M	9.3	21	19	42	35	9	6	28	14	14
K61674	♀ M	9.0	20	20	42	35	7	6	25	16	16
K61674	♀ M	8.1	21	20	45	37	9	6	27	16	16

the loop-like pale marking on the dorsum of the abdomen is faint or indistinct posteriorly, and is followed by two narrow white parallel bars; the venter has two small white spots just before the spinnerets. *Venatrix fuscus* is a morphologically similar species but lacks the pale loop-like markings and parallel white bars on the dorsal surface of the abdomen, and has two parallel or converging white bars on the venter (as does *L. kosciuskoensis* juveniles) in adult females. The epigynum of *V. fuscus* differs from *L. kosciuskoensis* in possessing an expanded mid-section of the median guide.

LIFE HISTORY

Mature females were collected in January and February. One specimen AM K61672, C.L. 8.8 mm, ♀ M, had an egg cocoon measuring approximately 13 mm in diameter. Males were not collected.

BURROW

Musgrave (1930, p. 104) records this spider as 'making a tunnel and covering the opening with a web or else living under stones.' A further note included with the specimen states 'Makes nests with funnel of web at mouth opening of burrow or else simple depression in earth under a rock'.

DISCUSSION

Lycosa kosciuskoensis falls within the genus *Orinocosa* as defined by Guy (1966). Chamberlin (1961, pp. 290-1) separates his genus *Orinocosa* from *Lycosa*, and related genera, due to the presence of the steeply sloping sides of the carapace, and the presence of stout median dorsal spines on the posterior tibiae. *Lycosa kosciuskoensis* has a carapace with gently sloping sides, lacks stout median apical spines on the dorsal surface of the posterior tibiae and the eyes differ in dimensions from that of the type species *Orinocosa aymara*. I therefore place my new species in the genus *Lycosa* pending a full generic revision of the Australian Lycosinae.

I believe that *Lycosa kosciuskoensis*, *Lycosa summa*, and *Venatrix fuscus* are closely

related species despite some minor differences in the arrangement of the eyes. All can be montane species as the National Museum, Victoria, has specimens of *Venatrix fuscus* from 6,000 feet (1830 m) at Mt. Hotham, in addition to a number of records from localities of much lower altitude in Victoria and Tasmania. These three species may represent a natural grouping if the mature males of *L. kosciuskoensis* and *L. summa* have a distinct tubercle on the outer edge of the fang as do the mature males of *Venatrix fuscus*. Further collecting in the alpine areas of southeastern Australia may clarify the relationship between these three species.

***Lycosa musgravei* sp. nov.**
(Figure 2a-c)

MATERIAL EXAMINED

HOLOTYPE: Australian Museum, AM KS23, ♀ M, C.L. 13.4 mm, Mount Kosciusko, N.S.W., collected by L. Voysey, 30 January, 1966, and donated by R. Mascord. Epigynum removed but retained with holotype. In spirit.

DESCRIPTION

Based on the holotype.

Carapace dark brown with a very narrow pale fawn longitudinal stripe extending from the light brown area within the ocular quadrangle to the posterior slope where it merges with the light brown marginal band; four dark edged fawn stripes radiate from the middle of the carapace, the anterior-most stripe curved forward to below the PL eyes; paturon dark brown ventrally, mid-brown anteriorly; fang dark brown; labium, maxillae, sternum and ventral surface of coxae dark brown. Abdomen dark brown above, darker on the sides, and black-brown on the ventral surface; black rounded wedge-shaped spot with elongated posterior corners lies in a paler brown area on the anterior dorsal surface of the abdomen, this spot is followed by five light brown chevrons. Legs brown above, orange-brown below, becoming darker brown distally; the femora with the distal ventral tip devoid of hair and ash-grey to black in colour.

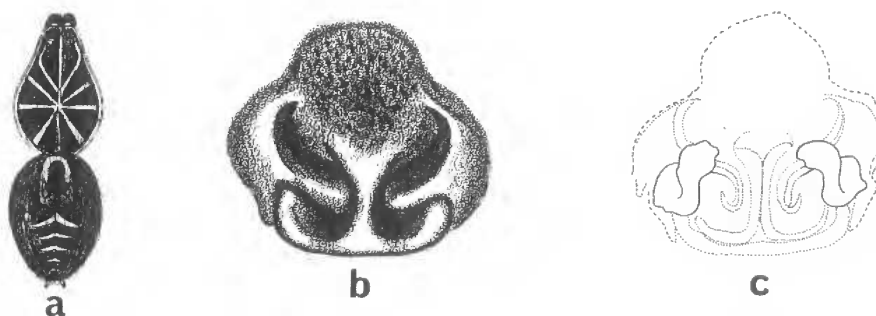


FIG. 2: *Lycosa musgravei*. a, holotype; b, epigynum of holotype; c, internal genitalia of holotype.

Anterior row of eyes slightly procurved, AM about the same diameter as AL, PM more than twice the diameter of the AM, and about 2/3 of their diameter apart. Ratio of eyes AM:AL:PM:PL = 15:13:34:29, distance AM:AM 7, AM:AL 6, AM:PM 15, AL:PM 12, PM:PM 23. Clypeus to AM about 25. Length of first eye row 74; length of second eye row 85. Chelicerae with three promarginal teeth, the middle one largest and joined to the base of the outer tooth; three retromarginal teeth of equal size. Labium a little longer than broad.

TABLE 5: MEASUREMENTS OF LEG SEGMENTS OF *L. musgravei* IN MM.

Leg	Femur	Patella	Tibia	Metatarsus	Tarsus
1	9.5	4.9	7.0	6.7	3.9
2	8.8	4.7	6.0	6.5	3.9
3	7.8	4.1	5.3	6.3	3.7
4	9.9	4.5	7.7	9.1	4.3
Palp	4.9	2.2	2.6	—	3.3

Epigynum broader than the width of the anterior row of eyes but not as broad as the second row; the median guide broadens anteriorly into a low flat plate, and the transverse guide has the extremities curved anteriorly (Fig. 2b). The internal genitalia is illustrated in Figure 2c.

DIAGNOSIS: *Lycosa musgravei* is similar in coloration to *Lycosa godeffroyi* but may be distinguished from the latter species by the shape of the epigynum; the transverse guide is wide with the ends curved anteriorly.

DISCUSSION

This new species is known from the holotype only. No information is available on the life history, burrow, habitat and altitude range. The epigynum appears to be distinctive and differs from all specimens of *Lycosa godeffroyi* examined by me. Further collecting is necessary to establish the degree of variation encountered within the species, and to describe the male palpal organ.

DERIVATION

Named in honour of Mr Anthony Musgrave, Curator of Insects and Arachnids at the Australian Museum, 1920–59, who collected the first lycosids from Mount Kosciusko, and published a number of papers on Australian spiders.

ACKNOWLEDGEMENTS

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LITERATURE CITED

- CHAMBERLIN, R. V., 1969. Results of the Yale Peruvian Expedition of 1911. The Arachnida. *Bull. Mus. Comp. Zool. Harvard* **60**: 177-299, pls. 1-29.
- DULHUNTY, J. A., 1947. Sub-surface peat temperatures at Mt. Kosciusko, N.S.W. *Proc. Linn. Soc. N.S.W.* **71**: 292-5.
- GENTILI, J., 1971. The main climatological elements. Pp. 119-88. In 'Climates of Australia and New Zealand'. World Survey of Climatology, Vol. 13. (Elsevier Publ. Co: Amsterdam).
- GUY, Y., 1966. Contribution a l'etude des araignées de la famille des Lycosidae et de la sous-famille des Lycosinae avec étude spéciale des espèces du Maroc. *Trav. Inst. scient. cherif. (Zool.)* **33**: 1-174, 97 figs.
- McKAY, R. J., 1973. The wolf spiders of Australia (Araneae: Lycosidae): 1. The bicolor group. *Mem. Qd Mus.* **16** (3): 375-98.
- McLUCKIE, J. and PETRIE, H. K., 1927. The vegetation of the Kosciusko Plateau. Part 1. The plant communities. *Proc. Linn. Soc. N.S.W.* **52**: 187-221, Pls. 10-19.
- MUSGRAVE, A., 1930. Mount Kosciusko in summer and winter. *Aust. Mus. Mag.* **4** (3): 100-8.